Commonwealth of Kentucky
Division for Air Quality

PERMIT STATEMENT OF BASIS

PSD/SYNTHETIC MINOR, PERMIT NO. F-01-005 REVISION III
KINGSFORD MANUFACTURING COMPANY
SUMMER SHADE, KENTUCKY
MARCH o5, 2003
MONIKA KANNADAGULI, REVIEWER
PLANT I.D. # 021-169-00012
APPLICATION LOG # 55473

SOURCE DESCRIPTION FOR REVSION III:

Kingsford Manufacturing Company is proposing a minor modification at their permitted source located in Summer Shade, Metcalfe County, Kentucky. The modification will include installation of charcoal briquette dryer and cooler, conversion of two existing coal silos to carbonaceous materials silos, addition of a new covered conveyor system. Emission changes will occur from this exhaust reconfiguration, but the permit emission limits will not change.

REGULATION APPLICABILITY:

All applicable regulations to the emission units are listed in the permit.

MINOR PERMIT - REVISION III - FOR CHARCOAL MANUFACTURING OPERATIONS

I. Installation of charcoal briquette dryer and cooler
Kingsford is proposing to install a third charcoal briquette dryer and cooler (6.5 ton/hr production) identical to the existing dryers/coolers. During the installation, there may be a necessity to modify the upstream material handling equipment. Possible additional modification may include a larger screw conveyor or increased belt speed on one or more of the conveyors. The emissions from these changes does not require significant revision.

II. Conversion of two existing coal silos to carbonaceous materials silos
Kingsford will store in these silos at different times various carbonaceous materials such as lignite, petroleum coke (pet coke), coke breeze, coal and/or wood char. The amount of usage of these carbonaceous materials will be based on the ability of the facility to manufacture or purchase char, or the necessity to purchase the carbonaceous materials. The facility will add a bin vent to each of the two carbonaceous materials silos to control emissions. To accommodate the reuse of the coal silos, a new conveyor will be added to transport coal from the covered coal bin (where coal is unloaded) to

the production area. Emissions associated with this modification do not require significant permit revision.

III. Addition of a new covered conveyor system
A covered coal conveyor system will be installed to transport coal from the existing coal storage bunker to the existing coal surge hopper. Emissions associated with this modification do not require significant permit revision.

SOURCE DESCRIPTION FOR REVSION II:

Kingsford Manufacturing Company is proposing a minor modification at their permitted source located in Summer Shade, Metcalfe County, Kentucky. The modification will include construction/operation of a fabric filter dust collector, relocating the existing packaging line, and installing an additional packaging line at the rear of the facility. Emission changes will occur from this exhaust reconfiguration, but the permit emission limits will not change

MINOR PERMIT - REVISION II - FOR CHARCOAL MANUFACTURING OPERATIONS

A Fabric Filter dust collector will be installed to control dust emissions associated with the charcoal briquet silo system (Emission Unit #04). The existing briquet handling dust collector will control dust emissions from the briquet handling operations at the exit of the dryers. The new dust collector will be rated at 20,000 cfm of exhaust volume. The dust collector will be located adjacent to the existing Briquet Handling Baghouse #1 next to the briquet storage bins. All fabric filters will continue to meet the PM/PM10 emission limit of 1.0 gr/scf specified in the permit. PM/PM10 emissions from the modification are estimated to be 3.0 lb/hr or 12.1 ton per year, and do not require a significant permit revision.

SOURCE DESCRIPTION FOR REVSION I:

Kingsford Manufacturing Company is proposing a minor modification at their permitted source located in Summer Shade, Metcalfe County, Kentucky. The modification will include construction/operation of charcoal briquet silos, and combine dyers and coolers into single stack. No emission changes will occur from this exhaust reconfiguration and the permit emission limits will not change.

MINOR PERMIT - REVISION I FOR CHARCOAL FURNACE/BRIQUET DRYER/PACKAGING LINE

Five (5) charcoal briquet silos will be installed to store briquets from two briquet dryers prior to packaging. Dust emissions from handling will be controlled by the existing dust collector permit as emission unit 04 in the permit. The stack height for the collector will be increased to 75 feet to ensure good dispersion. The multiple exhaust points associated with the briquets dryers (emission unit 02) and the briquet coolers (emission unit 03) will be combined into a single stack. The duct work will be equipped with test ports to allow emissions tests from both dyers and cooler to demonstrate compliance with the emission limits in the permit. These changes will require changes in monitoring and record keeping requirements regarding visible emissions observation.

ORIGINAL SOURCE DESCRIPTION STARTS

COMMENTS:

The Summer Shade plant is currently classified as a minor source as defined by Kentucky State Regulation 401 KAR 51:017 and the federal Prevention of Significant Deterioration (PSD) regulations in 40 CFR 52.21. The plant is classified as a "charcoal production plant", which is one of the 28 listed 100-tpy major source categories in the PSD regulations. Metcalfe County is classified as "attainment" or "unclassified" for all pollutants pursuant to Regulation 401 KAR 51:010. The proposed facility modifications will result in emissions increases in excess of 100 tpy for particulate matter less than 10 microns (PM_{10}) and nitrogen oxides (NO_x). The source will be synthetic minor for sulfur dioxide. The permittee has agreed to limit sulfur dioxide emissions to less than 40 tons per year, based on a rolling twelve (12) month total, to preclude Regulation 401 KAR 51:017, prevention of significant deterioration of air quality. Emissions increases of other pollutants are less than the significant net emission rates as defined in Regulation 401 KAR 51:017, Section 22. Consequently, the proposed facility modifications meet the definition of a "major source" under the PSD regulations, and the project is subject to evaluation and review under the provisions of the PSD regulations for emissions of PM_{10} and NO_x. Pursuant to Kentucky State Regulations 401 KAR 50:035 and 51:017, the source is required to obtain a federally enforceable permit to construct and operate the proposed plant, and the following six requirements must be addressed:

1. Demonstration of the application of Best Available Control Technology (BACT) to limit emissions of PM_{10} and NO_x.
2. Demonstration of compliance with each applicable emission limitation under Title 401 KAR Chapters 50 to 65, and each applicable emissions standard and standard of performance under 40 CFR 60, 61, and 63.
3. Air quality impacts analysis.
4. Class I area impacts analysis.
5. Projected growth analysis.
6. Analysis of impacts on soils, vegetation and visibility.

Section 3 of this determination summarizes the project's air emissions increases. Sections 4 though 7 summarize the information submitted by the applicant with regard to the six requirements listed above. Section 8 provides the Division's determination that the project meets all applicable requirements.

After the proposed facility modifications, the Summer Shade plant will be classified as a major source under the Title V permitting provisions of Kentucky State Regulation 401 KAR 50:035 and the federal regulations at 40 CFR Part 70. This preliminary determination addresses the PSD permitting requirements applicable to the proposed facility modifications. The determination also demonstrates that all regulatory requirements will be met for the modified sources and includes a draft permit which establishes the enforceability of all applicable requirements. However, since not all of the Summer Shade plant operations will be affected by the modifications, the draft permit does not address the entire facility. Accordingly, the source will be required to submit a comprehensive Title V operating permit application addressing the entire facility after the source completes the modifications and begins operation as a major source. For this reason, the attached draft permit is a PSD construction permit authorizing construction and operation of the proposed modifications, and is not a Title V operating permit.

2. BACKGROUND

A pre-application meeting was requested by the applicant and was held on January 19, 2000 at the Division's Frankfort, KY offices. The applicant and their environmental consultant met with representatives of the Division's air quality permitting and air dispersion modeling review staff. The applicant described the project, discussed the methodology for assessing air quality impacts, and proposed that the permit application be limited to the PSD permitting requirements for the proposed modifications and that the initial Title V permit application be submitted after the PSD permit is issued and the modified system is operating.

The applicant submitted an air quality Modeling Protocol for review by the Division in March, 2000. A copy of the Protocol was submitted for review by the Federal Land Manager (FLM) for the Mammoth Cave Class I Area. The Division provided comments on the Protocol in a letter dated May 12, 2000. Comments regarding the Protocol were also received by the applicant from FLM review personnel.

On June 29, 2000, the Division received a PSD permit application from Kingsford Manufacturing Company to construct and operate modifications to their Summer Shade charcoal manufacturing plant. At the Division's request, the applicant sent copies of the application to U.S. EPA Region 4 and to the FLM for the Mammoth Cave Class I Area. The application was logged complete by the Division on August 30, 2000.

EMISSION AND OPERATING CAPS DESCRIPTION:

The proposed modifications to the Summer Shade facility are described in Section 2 of the permit application submitted by the applicant. The applicant submitted an emissions inventory in Section 3 of their application and provided detailed emissions calculations in Appendix B. Maximum hourly and annual emission rates are presented in the application for each criteria pollutant. To preclude 401 KAR 51.017 for sulfur dioxide emissions, the total char production shall not exceed 7.0 tons per hour on a daily average basis and 50,000 tons during any consecutive 12-month period. For char production, the hourly and annual production rates are not directly comparable and annual production caps are used to limit sulfur dioxide emissions (i.e., rather than 8,760 hours per year).

Actual past emissions from the facility are compared with potential emissions after the proposed facility modifications. Actual emissions are calculated as the average of actual emissions for calendar years 1998 and 1999. Emissions from the proposed new charcoal furnace and briquetting operations are calculated based on maximum potential system throughputs. Emissions are estimated based on similar facility test data, engineering evaluation, and published EPA emission factors. Emissions are estimated for both point sources and for fugitive dust sources. The net emissions increases associated with the project are compared with the PSD significant emission rates in the following table:

Table 1

Pollutant	Project Emissions (tons per year)	PSD Significant Emission Rate* (tons per year)
Nitrogen Oxides (NO_x)	326.7	40
Particulate Matter < 10 microns (PM_{10})	182.1	15
Sulfur Dioxide (SO_2)	37.4	40
Carbon Monoxide (CO)	16.4	100
Volatile Organic Compounds (VOC)	12.3	40

* Significant emission rates as given in Regulation 401 KAR 51:017, Section 22.

The table demonstrates that the project will trigger PSD review for PM_{10} and NOx emissions. The permittee is taking a yearly emissions cap of 50,000 tons total char production during any consecutive 12-month period to preclude PSD review for sulfur dioxide emissions. The emissions increases of other pollutants are below the PSD significant emission rates. All facility sources with the exception of the solvent treated briquet (STB) operations are included in the emission inventory. The STB operations are currently permitted and will not undergo any modifications as a result of the project. Accordingly, the VOC emissions from the STB operations have not been included in the emissions inventory.

4. REGULATORY REVIEW

This section presents a discussion on the air quality regulations applicable to this project. In some cases the emission limit or technology standard based on these regulations may be superseded by the BACT requirements which are more stringent under PSD (see Section 5, Best Available Control Technology Review); however, any specific testing, monitoring, record keeping, and reporting requirements contained in these regulations will still have to be met by the source in addition to any requirements under PSD.

The federal requirements promulgated in 40 CFR Parts 60, 61, and 63 are not applicable to the project since the proposed project emissions sources are not included in any source categories subject to these requirements. Specifically, neither the new source performance standards at 40 CFR 60, nor the hazardous air pollutant standards at 40 CFR 61 and 63 are applicable to any of the existing plant sources or any of the proposed new sources at the plant.

As mentioned in the previous sections, the PSD permitting requirements of Kentucky State Regulation

401 KAR 51:017 and the federal regulations at 40 CFR 52.21, apply to the proposed facility modifications since the emissions increases of PM_{10} and NO_x will exceed 100 tpy. The Summer Shade plant is classified as a charcoal production plant, which is one of the listed 28 100-tpy major source categories. The plant is located in Metcalfe County which is currently designated as "attainment" or "unclassified" for all ambient quality standards. As shown in the table in the previous section, the plant modifications meet the definition of major source for NO_x and PM_{10} (i.e., emissions increases are greater than 100 tpy). PSD review applies to every pollutant for which the modifications will result in emissions increases in excess of the PSD significant emission rates. As shown in the table, the only pollutants subject to PSD review are PM_{10} and NO_x. For each of these pollutants, the applicant has to perform a best available control technology (BACT) demonstration and an ambient air quality analysis. Each of these components of the PSD review process is summarized in the following sections.

Applicable Kentucky state air emissions limitations are summarized in Section 4 of the permit application. The Kentucky "process weight" PM emissions standards at 401 KAR 59:010 are applicable to both the briquet dryer and the charcoal furnace operations. Demonstrating compliance with this standard is particularly important for the charcoal furnace in light of the history of the Summer Shade facility and the inability of the previous owner of the plant to operate the furnace in compliance with the applicable mass emissions limits. The applicant has provided an evaluation of the applicability of this standard to the wood dryer/charcoal furnace system and shows that the standard equates to an emission factor of 9.1 lb PM per ton of char produced by the furnace. The proposed BACT limit of 8.5 lb PM per ton of char is less than the process weight allowable rate. The "Emissions Comparison" application forms (DEP7007W) provided by the applicant show that the particulate emissions from the briquet dryers and briquet coolers will be considerably lower than the respective allowable rates per 401 KAR 59:010.

5. BEST AVAILABLE CONTROL TECHNOLOGY REVIEW

Pursuant to Regulation 401 KAR 51:017, Sections 9(1) and (2), a major stationary source subject to PSD review shall meet the following requirements:

(a) The proposed source shall apply the best available control technology (BACT) for each pollutant that it will have the potential to emit in significant amounts.

(b) The proposed source shall meet each applicable emissions limitation under Title 401, KAR 50 to 65, and each applicable emission standard and standard of performance under 40 CFR 60, 61, and 63.

The emissions increases associated with the proposed modifications are such that the modifications constitute a PSD major source. Emissions increases of NO_x and PM_{10} will exceed the corresponding PSD net significant emission amounts. Therefore, each of these pollutants is subject to BACT review.

The applicant has presented, in Section 5 of the permit application, a detailed BACT analysis that provides a "top-down" control technology analysis, a review of industry emissions control precedent, an assessment of environmental, energy, and economic impacts associated with control options, and support for the proposed BACT determinations. The BACT analysis submitted by the permittee follows the U.S. EPA guidance in the “New Source Review Workshop Manual” (U.S. EPA, October 1990). The key steps required by the top-down BACT process are:

1. Identify all control technologies.
2. Eliminate technically infeasible options.
3. Rank remaining control technologies by control effectiveness.
4. Evaluate most effective controls considering economic, environmental, and energy impacts, and document results.
5. Select BACT.

In their BACT analysis, the applicant points out that the federal definition of BACT is provided in 40 CFR Section 52.21(b)(12), and requires that the BACT determination be performed on a “case-by-case” basis and that the chosen control technology be “achievable” for the source category under consideration. For the proposed modifications to the Summer Shade charcoal manufacturing operations, the BACT analysis therefore addresses the question of BACT in the context of the charcoal manufacturing industry and its environmental, economic, and energy impacts. Some of these general considerations are discussed below.

Charcoal is produced from either batch charcoal kilns or from continuous charcoal furnaces. The U.S. EPA AP-42 Section 10.7 emission factors for the charcoal manufacturing industry are applicable to the batch charcoal kiln production method. The applicant’s proposed use of a continuous charcoal furnace process with high efficiency cyclone collectors and an ACC afterburner provides considerable environmental and energy impact improvements when compared to the charcoal kiln method of charcoal manufacturing. Not only are the air emission factors much lower for the furnace process compared to charcoal kilns (e.g., compare the EPA AP-42 Section 10.7 emission factors for charcoal kilns with the emission factors in Section 3 of the permit application), but the furnace process also results in less fugitive dust and in less wastewater generation due to the enclosure of the char handling processes compared to the kilns’ practice of handling char outside. The energy improvements associated with the furnace/ACC process are due to the recovery of ACC waste heat to dry both the wood in the wood dryer and the charcoal briquets in the briquet dryers. The applicant therefore argues that the selection of the continuous furnace production method is an inherent and essential element to the proposed application of BACT. The technology has been pioneered by the Kingsford Manufacturing Company and refined based upon experience at other Kingsford plants where the process is utilized. The proposed air pollution controls were determined to be BACT at the Kingsford Belle, Missouri plant in a PSD permit issued in 1994.

The following sources and pollutants at the Summer Shade facility are addressed in the BACT analysis:

- <u>Charcoal furnace and ACC afterburner NO_x emissions</u> The project NO_x emissions increases result from the proposed installation of an ACC afterburner on the existing charcoal furnace operations. NO_x emissions from these processes are subject to BACT. Since a portion of the ACC exhaust gases pass through the briquet dryers, BACT NO_x emissions limits are proposed for the ACC stack and for the briquet dryer stacks.

- Charcoal furnace/wood dryer/ACC PM_{10} emissions The reactivation and operation of the existing charcoal furnace and the installation of the rotary wood dryer will result in PM_{10} emissions increases which are subject to BACT.

- Briquet dryer and briquet cooler PM_{10} emissions The installation of a second briquet dryer and briquet cooler will result in PM_{10} emissions increases. In addition, the proposed use of ACC waste off-gases to supply heat to the existing briquet dryer will change its method of operation. As such, PM_{10} emissions from both dryer/cooler systems are subject to BACT.

- Material handling and storage operation PM_{10} emissions The proposed facility modifications will result in the addition of several new point and fugitive sources of PM_{10} emissions. These point sources include new storage silo bin vents, a new manufacturing/packaging dust collector, and a char truck loading operation. Miscellaneous fugitive dust sources include material receipt, storage, and handling operations and truck traffic on plant roadways. PM_{10} emissions from these sources are subject to BACT.

Table 2 presents a summary of the emissions limits and control techniques determined to be BACT for each of these emissions units and pollutants. The following subsections summarize the applicant's support for the BACT determinations.

Table 2

A. Charcoal Furnace and Rotary Wood Dryer

EIS No.	**Emissions Unit/Process**	**Pollutant**	**Best Available Control Technology**	**Emission Standard**
ACC Stack	Charcoal Furnace Wood Dryer Operation limitations: 7.0 tons/hour char; 50,000 tons/year char	NO_X	Good ACC combustion control, low NO_x burners	Emissions of NO_x shall not exceed 91.0 pounds per hour from the ACC stack.
		PM_{10}	High efficiency cyclone collectors, ACC direct afterburner	Emissions of PM_{10} shall not exceed 47.6 pounds per hour from the ACC stack.

B. Briquet Dryers

EIS No.	**Emissions Unit/Process**	**Pollutant**	**Best Available Control Technology**	**Emission Standard**
BRIQDRY1, BRIQDRY2 **4/15/02** **Stack Hieght increased to 75 ft & combined with coolers**	Briquet Dryer #1 Briquet Dryer #2 Operation limitations: 13.0 tons/hour dry briquets (total)	NO_X	Good ACC combustion control, low NO_x burners	Emissions of NO_x shall not exceed 13.65 pounds per hour total (6.83 pounds per hour from each briquet dryer)
		PM_{10}	Good operating practices	Emissions of PM_{10} shall not exceed 5.0 pounds per hour total (2.50 pounds per hour from each briquet dryer)

Table 2, continued

C. Briquet Coolers

EIS No.	Emissions Unit/Process	Pollutant	Best Available Control Technology	Emission Standard
COOLER1, COOLER2 **4/15/02** **Stack Hieght increased to 75 ft & combined with dryers**	Briquet Cooler #1 Briquet Cooler #2 Operation limitations: 13.0 tons/hour dry briquets (total);	PM_{10}	Good operating practices	Emissions of PM_{10} shall not exceed 4.12 pounds per hour total (2.06 pounds per hour from each briquet cooler)

D. Material Handling & Storage

EIS No.	Emissions Unit/Process	Pollutant	Best Available Control Technology	Emission Standard
BRIQBH1 BRIQBH2 SILOBV3 SILOBV2 SILOBV5 NITRATE CHARLOAD SILOBV4	Briquet Handling Starch Silo Lime Silo Sawdust Silo Nitrate Silo Char Load Drop Mix Tank (Total of 8 dust collectors)	PM_{10}	Fabric filter dust collectors	Emissions of PM_{10} from each of the fabric filter collectors serving the sources shall not exceed an outlet PM_{10} concentration of 0.01 gr/scf
Fugitive dust	Coal Drop Points Char Loading Char Receipt Wood Receipt and Storage Plant Roadways		Reasonable measures to minimize fugitive dust	

A. BACT for the Charcoal Furnace and Rotary Wood Dryer

The multi-hearth charcoal furnace produces char from wood feedstock via a pyrolysis process. A rotary wood dryer will be installed to dry the wood fed to the furnace. Exhaust gases from both the dryer and the furnace will pass through high-efficiency cyclones and will than be combined in an After Combustion Chamber (ACC), where the gases will be oxidized at high temperatures. The ACC will provide control of CO, VOC, and residual PM emissions in the cyclone exhaust gases. Waste heat from the ACC will be used in the rotary wood dryer and in the facility charcoal briquet dryers. Air emissions associated with the dryer/furnace char production system will primarily be emitted through the ACC stack, with a fraction of the emissions being exhausted through the briquet dryer stacks. As such, the BACT analysis provided by the applicant addresses emissions that are generated by the dryer/furnace system but separate BACT emissions limits are proposed for the ACC stack and the briquet dryer stacks.

NOx Emissions

The major source of NO_x emissions for the proposed project is the charcoal furnace and the ACC afterburner. As a portion of the ACC gases will be routed through the briquet dryers and released from the dryer stacks, the briquet dryers are also an indirect source of NO_x. During normal operations (i.e., briquet dryers operating on ACC waste heat), approximately 85% of the NO_x emissions are exhausted through the ACC stack and the remainder is exhausted through the briquet dryer stacks. Combustion of auxiliary natural gas fuel in the ACC and in the charcoal furnace is an additional minor source of NO_x emissions.

Charcoal manufacturing results in NO_x emissions as a result of both nitrogen in the wood feedstock and from thermal NO_x generated during the combustion of the furnace offgases. The EPA AP-42 Section 10.7 emission factor for charcoal manufacturing in kilns is 24 lb NO_x per ton of char produced. The use of ACC combustion controls is proposed as BACT for the Summer Shade charcoal furnace project. The proposed BACT NO_x emissions limit is 13 lb NO_x per ton of char produced. This emission limit was determined to be BACT for NO_x emissions at the Kingsford Belle, Missouri plant as part of issuance of the PSD permit for installation of a charcoal furnace/ACC system in 1994. Note that the NO_x hourly mass emission rates presented in Table 2 represent "worst case" hourly emissions from the ACC and the briquet dryer stacks (e.g., the ACC emission rate represents the operating scenario in which the briquet dryers are not operating and all emissions are exhausted through the ACC stack). The hourly emission rates shown in the table are therefore not additive.

The proposed BACT for NO_x emissions control from the charcoal furnace and ACC is the use of combustion controls. Combustion controls will minimize NO_x formation in the ACC by staging combustion and by limiting oxygen in the combustion zone. The design of the ACC incorporates Low Excess Air (LEA) and staged combustion low-NO_x combustion techniques. LEA and staged combustion minimize the potential for NO_x formation by restricting combustion air at the peak oxidation temperatures and by completing combustion in stages. The charcoal furnace operates under oxygen lean conditions thereby minimizing potential formation of thermal NO_x. The furnace exhaust gases entering the ACC are oxidized at a peak temperature of 2000^{o}F, and the oxidation process is completed under turbulent mixing (vortex flow pattern) conditions, with combustion air introduced to complete combustion at 1400^{o}F through the remaining chamber.

Other control technologies were evaluated and were eliminated based on technical and economic considerations. Application of post-combustion NO_x control technologies are unproven for charcoal manufacturing processes. Application of SCR to the ACC or briquet dryer exhausts is technically infeasible as neither the ACC or briquet dryer flue gas is within the temperature range necessary for SCR, and because of concerns regarding the pollutant loadings in these streams. Application of SNCR to the ACC exhaust gases is of questionable efficacy, as SNCR has never been demonstrated on charcoal manufacturing sources. The transfer of SNCR to this industry is highly questionable because the operating conditions within the ACC are very different from the conditions within utility boilers, industrial furnaces, gas turbines, and other such processes to which the alternative NO_x technologies have been applied. The variability associated with the AC operation, including NO_x concentrations, temperatures, and exhaust volume variations, makes it difficult to predict the efficacy of SNCR in reducing NO_x emissions. Furthermore, the cost effectiveness of installing and operating an SNCR system on the ACC exhaust was evaluated by the applicant and the costs are shown to be in excess of $10,000 per ton, which is considered unreasonably high. This high cost is due to the need for an auxiliary burner system to supply heat to the briquet dryers. The company's proposed BACT consists, in part, of the efficient use of excess heat from the ACC as the heat source for the charcoal briquet dryers. A portion of the ACC offgases will be ducted to the two charcoal briquet dryers, where the heat will be used to remove moisture from the "green" briquets. Therefore, the presence of unreacted ammonia in the ACC exhaust gases due to SNCR "ammonia slip" is a viable concern to the company. Ammonia would potentially be absorbed into the charcoal briquets, which would be unacceptable to Kingsford's high-quality consumer product.

The application of "low-NO_x" burners is proposed as BACT for the auxiliary combustion sources. Specific burner vendors and model types have not yet been selected for the project, as the project is in the engineering design phase.

Based on a review of the EPA RBLC Database and the additional industry precedent information presented by the applicant, the Division agrees that the proposed NO_x emission limit of 13 lb NO_x per ton of char produced represents BACT for the charcoal manufacturing industry.

PM/PM_{10} Emissions

The BACT analysis for PM and PM_{10} emissions are presented together. The applicant has estimated that approximately 80% of the controlled PM emissions exhausted to atmosphere from the dryer/furnace system consist of PM_{10}. Both the charcoal furnace and the wood dryer are sources of PM emissions. The EPA AP-42 Section 10.7 uncontrolled emission factor for charcoal manufacturing in batch charcoal kilns is 310 lb PM per ton of char produced. The proposed BACT emissions limit for the charcoal furnace/wood dryer process is 8.5 lb PM/ton of char. This emission limit was determined to be BACT for PM emissions at the Kingsford Belle, Missouri plant as part of issuance of the PSD permit for installation of a charcoal furnace/ACC system in 1994.

The proposed BACT for PM/PM_{10} emissions control from the furnace/dryer system is the use of high efficiency cyclones on the charcoal furnace and wood dryer exhausts, and ducting the cyclone exhausts to the ACC afterburner, which has been found to further reduce PM emissions due to the oxidation of carbonaceous PM. The use of cyclones coupled with an ACC afterburner has been proven to be an effective PM control system that also provides reliable, safe operation, and that achieves the top level of VOC and CO control effectiveness that is possible. KMC operates similar control systems at five of their charcoal manufacturing plants, and has permitted and installed new control systems over the last six years at two of these plants. The unique advantages of this proposed control configuration include the following:

- The use of cyclone collectors achieve efficient recovery of materials that are either recycled back into the charcoal furnace (the wood dryer cyclone fines) or that are added to the char conveyed from the furnace (the furnace cyclone fines).

- The use of the ACC achieves highly efficient destruction of VOC and CO present in the dryer and furnace offgases. The ACC achieves good mixing, residence times well in excess of one second, and temperatures in excess of 1,400°F. These conditions exceed the design requirements for most thermal oxidizers used to control VOC emissions.

- The use of the ACC and cyclones provides a safe manner to control the combustible, explosive offgases generated by the charcoal furnace.

- The use of the ACC provides a source of heat for the wood dryer and to dry the charcoal briquets, which both minimizes the plant's energy consumption and the air emissions that would be associated with combustion of auxiliary fuel.

Other control technologies were evaluated and were eliminated based on technical and economic considerations. Alternative PM control systems include fabric filters, wet and dry electrostatic precipitators (ESP's), and high-efficiency wet scrubbers. The installation of any alternative PM control systems directly on the charcoal furnace exhaust prior to the ACC is considered to be technically infeasible due to the presence of the high concentrations of combustible organics and CO in the furnace off-gases. Significant safety concerns would preclude the use of any PM control systems other than a mechanical collector (e.g., cyclone) prior to the oxidation of the energy rich furnace offgases. Similarly, there are technical concerns associated with installation of any alternative PM controls directly on the wood dryer exhaust prior to the ACC due to the presence of high moisture content and organic matter. Therefore, the applicant limited evaluation of alternative controls to add-on controls that could be applied to the ACC exhaust gases.

The use of any additional or alternate add-on air pollution controls as BACT has to be demonstrated to be effective, reliable, and safe in this kind of application before a conclusion can be drawn regarding technical feasibility. Installation of any additional "end of pipe" controls on charcoal furnace/ACC systems has not been demonstrated in practice to be technically feasible for the charcoal industry. Not only have add-on controls not been commercially demonstrated to be effective at controlling any similar furnace/ACC system, but control vendors are unable to provide emissions control guarantees due to several "unknowns" regarding the ACC exhaust gases. Technical concerns include:

- The effectiveness of add-on particulate matter control systems in reducing ACC exhaust gases is unknown. Control vendors will not provide performance guarantees without detailed information regarding particulate matter loadings, the particle size distribution, particle resistivity (for electrostatic precipitators) and the presence of other pollutants in the gas stream. Although Kingsford has ACC emissions test data during normal operations, they do not have test data during ACC excursions, nor is any data available regarding emissions that may be present after the ACC gas quenching and cooling that would be necessary for any add-on pollution controls. Kingsford engineering calculations demonstrate that the expected particulate loading after ACC quenching would be relatively low (0.015 to 0.03 gr/acf). Based on this low inlet loading, it is expected that control vendors would only guarantee modest percentage reductions in particulate

  emissions (e.g., 80-90% rather than the 99-99.9% range that is typically published in vendor sales literature).

- The particle size distribution of the particulate matter in the ACC exhaust is unknown. It is very difficult to stack test the ACC due to extreme temperatures. Although Kingsford has successfully measured particulate matter emissions using EPA Method 5 and a modified test probe, PM_{10}

testing has not been possible in accordance with EPA Method 201A due to technical problems associated with operating an in-stack cyclone separator. Instead, Kingsford has performed PM_{10} testing using a different methodology (i.e., a heated out-of-stack Andersen impactor). As a result, the ACC exhaust PM_{10} fraction is estimated to be in the range of 50-80 percent of the total PM, but the fraction depends on how PM_{10} is defined (e.g., whether condensible particulate matter is classified as PM_{10}). As a result, the necessary particle size information required by control vendors is not available.

- The variability of pollutant loading as a function of feedstock variability and furnace production variability is not known. This issue is particularly important in designing a pollution control system that would be used to control variable exhaust flowrates. The large pollution control systems under consideration (capacities of 200,000 to 250,000 acfm) may not perform well if inlet loadings and/or flowrates vary.

- The safety of operating an induced draft ACC system rather than a natural draft ACC is unknown. Safety is a primary consideration for operation of the charcoal furnace, the rotary wood dryer, the ACC, and all the associated ductwork. It is critically important to maintain the charcoal furnace and the furnace offgas ductwork at a slightly negative pressure to prevent combustible gases from being released and the consequent risk of fire or explosion. Since the ACC is open at the top, it acts to some extent as a "buffer" that is capable of handling process upsets and sudden changes in exhaust flow or pressure. If the ACC were to be ducted through a quench and control system, an ID fan would be necessary, and the applicant has concerns that the resultant system would not be as "resilient" in the event of process upsets.

All of the above concerns lead us to the conclusion that installation of any add-on control systems would be of questionable efficacy and would require operation of a pilot system for an extended period of time to demonstrate reliability, safety, and effectiveness. For any ACC add-on control system, it will be necessary to significantly cool the ACC exhaust gases prior to their entering the control device. The ACC stack exhaust volume varies from approximately 315,000 acfm to 370,000 acfm (depending whether the briquet dryers are in operation) and the exhaust temperature is approximately 1,800^{o}F. For fabric filter and dry ESP systems, inlet gas temperatures will need to be cooled to 400-450^{o}F to prevent damage to the control devices. Even if a wet scrubber or wet ESP system is used, it will be necessary to precool the exhaust to prevent thermal shock to the system (and to minimize the volume of air treated). The applicant would have to address the following technical and environmental issues to install and operate such a water quench and/or a scrubber system:

- A water quench system is the cooling method that would need to be employed due to the high temperatures and large volume of exhaust. Using radiant cooling or dilution air would be cost prohibitive due to the extremely high cost of the necessary ductwork for radiant cooling and the resultant volume of air that would result if dilution air were added. The applicant calculates that the quench water requirements would be at least 200 gallons per minute. This is equivalent to 96 million gallons per year if the system is in continuous operation. The Summer Shade plant only uses approximately 20 gallons per minute currently.

- The Summer Shade plant water supply is provided by a municipal water supply which cannot supply the quantity of water needed for a water quench system. A new deep well (or wells) and large pump system would have to be installed. The applicant would have to investigate the capacity of the aquifer to determine the reliability of water supply, and would have to obtain all necessary environmental permits.

- The water quality would have to be assessed and a water treatment system will be necessary to ensure that the quench water does not result in build up of salts and minerals due to evaporation of the cooling water. The presence of minerals in the water would likely also add fine particulate matter to the ACC exhaust stream after quenching.

- An emergency bypass will be essential to ensure that the ACC exhaust gases can be vented directly to atmosphere in the event of a system malfunction such as the loss of water to the quench system. The bypass would prevent catastrophic thermal damage to the downstream pollution control systems. An extensive control system including thermocouples, dampers, and instrumentation will be necessary to ensure safe and reliable operation of the exhaust gas handling and treatment systems.

- Any wastewater generated by either a quench system or a wet scrubber system will be a significant concern to the applicant since the Summer Shade plant does not have wastewater treatment capacity.

Despite these technical concerns, the applicant evaluated the cost effectiveness of installing alternative PM control systems. The costs of the following add-on PM control systems were evaluated for the ACC exhaust stream:

(1) Reverse-air fabric filter. If a baghouse system were to be used then it would likely be necessary to utilize a reverse air system with a relatively low gas/cloth ratio and offline cleaning (due to the low inlet loadings and small particle size range). Use of filter aids to precoat the bags may also be necessary to achieve appreciable control. Water quenching to 400-450^{o}F is assumed to enable the use of fiberglass bags which can tolerate temperatures up to 500^{o}F. Due to the uncertainties in particle size and loadings, the particulate matter removal efficiency is assumed to be 90%. The baghouse would be sized to control approximately 250,000 acfm.

(2) Pulse-jet fabric filter. The costs of installing and operating a pulse-jet baghouse have also been evaluated even though it is unclear that a pulse-jet baghouse would be effective at collecting fine particulate matter at a high gas/cloth ratio. A pulse-jet baghouse is also assumed to achieve a particulate matter removal efficiency of 90%.

(3) Electrostatic precipitator (ESP). A 4-stage precipitator is presumed to be necessary based on assumptions regarding particle size and resistivity. Due to the uncertainties in particle size and loadings, the particulate matter removal efficiency is assumed to be 90%.

The EPA costing methodology in the "OAQPS Control Cost Manual" was used by the applicant to estimate the cost effectiveness of each of thee controls. The applicant estimated costs of auxiliary equipment such as the quench system, refractory-lined ductwork, a bypass system, fans, and an exhaust stack. The estimated costs of installing and operating add-on controls are prohibitive. The total capital investment is $6.4 to $7.4 million for the fabric filter options and $14.5 million for the ESP option. All of the cost effectiveness values are significantly above $10,000 per ton of pollutant abated, which demonstrates that installation of add-on controls to reduce PM from the ACC exhaust is not cost effective.

Based on the top-down BACT analysis presented by the applicant, the Division agrees that the proposed PM emission limit of 8.5 lb PM per ton of char produced and the PM_{10} emission limit of 6.8 lb the PM_{10} per ton of char represent BACT for the charcoal manufacturing industry.

B. BACT for PM/PM_{10} Emissions from the Briquet Dryers and Briquet Coolers

The briquet dryers are used to remove moisture from charcoal briquets. Charcoal briquets pass through the briquet dryers on a travelling grate through which heated gases pass. The briquet coolers consist of the final sections of the dryers where ambient air is passed through the briquet bed to cool the briquets. The briquet dryer and cooler exhausts are sources of PM/PM_{10} emissions. PM emissions from the briquet dryers are estimated to be 0.7 lb PM/ton of dry briquet produced, with 55% of the PM in the form of PM_{10}. This equates to overall mass emission rates from the dryers of 9.1 lb/hr PM and 5.0 lb/hr $PM_{10.}$ Briquet cooler emissions are estimated based on an exhaust concentration of 0.03 gr/scf, with 30% of the PM in the form of $PM_{10.}$ This equates to overall mass emission rates from the coolers of 13.75 lb/hr PM and 4.12 lb/hr $PM_{10.}$

The proposed BACT for PM and PM_{10} emissions from the briquet dryers and the briquet coolers is good design coupled with good operating and maintenance practices. The dryers and coolers will be operated similarly to dryer and cooler operations at other Kingsford facilities, which have been shown to be capable of maintaining low outlet PM concentrations in the range of 0.01-0.03 gr/scf. The use of ACC exhaust gases to provide heat to the briquet dryers is also considered BACT as use of this waste heat will minimize energy and environmental impacts associated with operation of the dryers.

Other add-on PM control technologies were evaluated and were eliminated based on technical and economic considerations. Alternative PM control systems include fabric filters, wet and dry ESP’s, and high-efficiency wet scrubbers. The briquet dryer exhaust gases contain high moisture contents and present condensation concerns as the exhaust gas temperatures are close to the dew point. In addition, the briquet dryers are susceptible to briquet bed fires that present spark and fire hazards for any add-on PM control system. The moisture content in the briquet cooler exhaust stream should not present condensation problems unless the cooler and dryer exhausts are combined, in which case the lower temperature cooler exhaust combined with the dryer exhaust stream may result in condensation problems. These technical concerns indicate that the use of fabric filtration is not advised for this application. Although the condensation concerns can be mitigated by reheating of the exhaust gases and by insulation of the ductwork, the briquet dryer fires are considered to present an unacceptably high risk for the use of fabric filtration.

The primary technical concern with regard to the efficacy of add-on PM controls on the briquet dryer and cooler exhausts is the relatively low PM and PM_{10} concentrations in the exhausts. The PM concentration in the briquet dryer exhaust gases are estimated to be approximately 0.02 gr/scf and the PM_{10} concentration is estimated to be approximately 0.01 gr/scf. The PM and PM_{10} concentrations in the briquet cooler exhausts are estimated to be 0.03 and 0.01 gr/scf, respectively. These concentrations are very low considering that PM control vendors typically guarantee their control device outlet PM concentrations in the range from 0.005 to 0.01 gr/scf. PM control systems can certainly achieve appreciable reductions in PM emissions, even at these concentrations, but the equipment must be designed to accommodate these low inlet loading. In the case of fabric filters, this may require a lower gas/cloth ratio and the use of special filtration media. The expected PM removal efficiency is estimated to be 90% rather than the 99+% removal efficiency estimates that are typically provided in the literature for PM control systems such as fabric filters and ESP’s.

The use of wet scrubbers is not considered feasible at the Summer Shade facility due to the lack of adequate water supplies and wastewater treatment facilities. However, the use of a wet ESP to control the briquet dryer exhausts has been evaluated due to the device’s relatively low wastewater generation rate (approximately 1-3 gpm). A wet ESP would provide efficient removal of both total PM and fine particulate matter and, most importantly, would not be susceptible to condensation or fire hazards due to its inclusion of a wet scrubbing section.

The costs of the following add-on control systems were evaluated for the briquet cooler and the briquet dryer exhausts:

- Wet ESP Based on the technical feasibility grounds, a wet ESP system is considered to be the most effective add-on PM control option for the briquet dryer and cooler exhausts. Since the EPA cost algorithms do not address wet ESP's, a vendor budgetary quote was obtained by the applicant for a wet ESP to control three different exhaust stream options: (1) the briquet dryer exhausts only; (2) the briquet dryer and cooler exhausts combined; and, (3) the cooler exhausts only. The installation and annual operating costs of these three wet ESP options were then evaluated using EPA control cost methodologies.

- Fabric Filter The costs of installing and operating a fabric filter on the briquet cooler exhausts were estimated using a vendor budgetary quote and EPA OAQPS control cost estimates.

The cost effectiveness analysis presented by the applicant shows that the annualized costs range from $8,500 to $25,100 depending on the process and control methodology. These costs are considered excessive, and the installation of add-on PM controls is therefore not considered cost effective.

Based on the top-down BACT analysis presented by the applicant, the Division agrees that good operating practices represents BACT for the briquet dryers and coolers. The Division accepts the following mass emission rates as BACT for PM and PM_{10} emissions from these sources:

- Briquet Dryers Total emissions from the two dryers will not exceed 9.1 lb/hr PM and 5.0 lb/hr $PM_{10.}$

- Briquet Coolers Total emissions from the two coolers will not exceed 13.75 lb/hr PM and 4.12 lb/hr $PM_{10.}$

C. BACT for PM/PM_{10} Emissions from Material Handling and Storage Operations

Proposed material handling and storage operations at the Summer Shade facility will result in point and fugitive PM/PM_{10} emissions. Proposed operations include receipt and storage of wood and coal in stockpiles, storage of raw materials in silos, dry briquet handling and packaging operations, char truck loadout operations, and truck traffic on plant roadways.

The proposed BACT for PM and PM_{10} emissions from material handling and storage operations is the use of storage silos for all raw materials with the exception of wood and coal, which have inherently high moisture contents. Storage silos used for raw materials with high dust potential (i.e., starch, lime, nitrate, and dry wood) will be equipped with bin vent fabric filters. Dust generated by briquet handling, storage, and packaging operations will be controlled by fabric filter dust collectors Unloading of trucks delivering wood will be conducted in a truck dump receiver that will minimize fugitive dust emissions. Unloading of trucks delivering char will be also be conducted in a truck dump receiver. Char loadout will be conducted in an enclosure equipped with a fabric filter. All inplant roads that will be subject to raw material and finished product truck traffic will be paved and properly maintained so as to minimize truck-generated fugitive dust.

BACT is determined to be the use of fabric filter dust collectors and the use of good operating and maintenance practices to minimize fugitive dust emissions. The use of fabric filtration for these sources represent the "top" level of PM control available. Accordingly, installation of alternative controls was not evaluated.

The Division agrees that the proposed use of fabric filters to control PM emissions from raw material storage silos and from briquet handling, storage, and packaging operations represents BACT. The Division also agrees that the proposed measures to minimize fugitive dust from truck traffic, wood receipt, and char truck loadout operations represent reasonable measures to minimize nuisance dust from such operations and are considered BACT for these sources.

6. AIR QUALITY IMPACT ANALYSIS

Pursuant to Regulation 401 KAR 51:017, Section 12, an application for a PSD permit shall contain an analysis of ambient air quality impacts in the area that the proposed facility will affect for each pollutant that it will have the potential to emit in significant amounts as defined in Section 22 of the same regulation. The purpose of this analysis is to be able to demonstrate that allowable emissions from the proposed source will not cause or contribute to air pollution in violation of applicable air quality standards or adversely impact air quality related values (AQRVs) at surrounding Class I areas. The Summer Shade facility is located approximately 50 km from the Mammoth Cave Class I area. The process to demonstrate that the Summer Shade facility will not cause adverse air quality impacts is a multi-step process that includes determining facility emissions, developing an emission inventory of other local emission sources, determining a representative ambient air background concentration, and conducting an air dispersion modeling analysis.

As determined in Section 3 of this determination, the proposed project at the Summer Shade facility will result in a significant net emission increase of both NO_X and PM_{10}. The project is not significant for any other PSD pollutant. Consequently, an air quality modeling analysis was conducted for NO_X and PM_{10} emissions. The air quality modeling analysis provided the following information:

(1) Comparison between the PSD ambient air quality significance levels and predicted project concentrations.

(2) Demonstration that the predicted project concentrations did not exceed the PSD increment values as defined in Regulation 401 KAR 51:017, Section 23.

(3) Demonstration that the predicted project concentrations plus regional pollutant background concentrations did not exceed the appropriate National Ambient Air Quality Standards (NAAQS) as defined in Regulation 401 KAR 53:010.

(4) Demonstration that the predicted project concentrations did not adversely impact AQRVs at the Mammoth Cave Class I area.

A. Modeling Methodology

All of the applicable air quality criteria are presented in Table 3. Based on the guidelines contained in 40 CFR Part 51 Appendix W, if the maximum predicted impacts for any pollutant are found to be below the significance levels, then it is assumed that the proposed project cannot cause or contribute to a violation of the PSD pollutant increments or the national ambient air quality standards (NAAQS). If impacts from the proposed project are above the significance levels then a refined air quality modeling analysis is required for that specific pollutant and the corresponding averaging period.

Table 3

Pollutant	Averaging Period	Significance Levels ($\mu g/m^3$)	De-Minimus Monitoring Level ($\mu g/m^3$)	PSD Class II Increments ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
NO_x	Annual	1	14	25	100
PM_{10}	Annual 24-hour	1 5	NA 10	17 30	50 150

A hybrid version of the Industrial Source Complex Short Term model (ISCST3, Version 99020) containing the Plume Rise Enhancement Model (PRIME) algorithms and referred to as ISCPrime was used for the air quality modeling analysis for the Class II area demonstration. The ISCPrime air dispersion model was selected because of the improvement in building downwash algorithms over the downwash algorithms contained in the current version of ISCST3. The ISCPrime air dispersion model is not a U.S. EPA approved model; however, the ISCPrime air dispersion model has been shown to be a "better" model according to the requirements of 40 CFR Part 51 Appendix W 3.2.2.b. Since the Summer Shade facility contains emission sources with release characteristics similar to the sources used in the demonstrations required under 40 CFR Part 51 Appendix W 3.2.2.b., the use of the ISCPrime air dispersion model is appropriate for the evaluation of ambient air impacts.

Per U.S. EPA guidance, the regulatory default option in the ISCPrime air dispersion model was selected. A rural land use was determined for the Summer Shade area and this option is therefore appropriate. Surface meteorological data and concurrent upper air meteorological from Nashville, TN data for the 1991-1995 period were used in the air quality modeling analysis. These data can be considered representative of the meteorological conditions at the Summer Shade facility. A Good Engineering Practice (GEP) stack height analysis was performed for all of the stacks at the facility and building downwash information was included in the ISCPrime air quality modeling study. Finally, the collection of site-specific ambient air background data were not required for the project as existing data from the Kentucky ambient air monitoring program were deemed representative of the Summer Shade area.

B. Modeling Results - Class II Area Impacts

The Summer Shade facility is located in Metcalfe County, which is a Class II area and is in attainment for all criteria air pollutants. There are several types of emission sources at the Summer Shade facility including stack sources, fugitive sources (i.e., piles), and roadway sources. Maximum short-term emission rates from all of the sources were used to assess short-term and annual ambient air impacts.

A screening air quality modeling analysis determined that emissions from the proposed project would result in ambient air concentrations that were greater than the PSD significance levels. Therefore, a refined air quality modeling analysis was required. A local emission inventory was developed that included all sources of NO_x and PM_{10} within a 65-km radius of the Summer Shade facility. It should be noted that some sources within this 65-km radius were screened out of the refined air quality modeling analysis based on their magnitude of emissions and distance to the Summer Shade facility. The refined air quality modeling analysis was conducted to demonstrate that the Summer Shade facility in conjunction with other local emission sources and a regional background ambient air concentration would not exceed the NO_x and PM_{10} NAAQS. The refined air quality modeling analysis also included a PSD increment assessment, which included only emissions that could potentially consume a portion of the PSD increment. Both the NAAQS and PSD increment analysis successfully demonstrated that emissions from the proposed project at the Summer Shade facility would meet applicable standards. The results of the screening and refined air quality modeling analyses for the Class II area are summarized in the Table 4. For more complete information, the air quality modeling results are provided in Tables 6-7 through 6-11 of the permit application.

Table 4

Pollutant	**Averaging Period**	**Significance Levels** ($\mu g/m^3$)	**Peak Modeled Significance Levels** ($\mu g/m^3$)	**NAAQS** ($\mu g/m^3$)	**Modeled NAAQS** ($\mu g/m^3$)	**PSD Increment** ($\mu g/m^3$)	**Modeled PSD** ($\mu g/m^3$)
NO_2	Annual	1	1.97	100	35.2[a]	25	1.97
PM_{10}	Annual 24-hour	1 5	0.36 34.0	50 150	NA 104.1[b]	17 30	0.36 24.4

(a) Includes 28 $\mu g/m^3$ of background concentration.
(b) Includes 47 $\mu g/m^3$ of background concentration.

C. Modeling Results - Class I Area Impacts

The Mammoth Cave National Park Class I area is within approximately 50 km of the Summer Shade facility. There are no other Class I areas within 200 km of the facility. An analysis was performed to evaluate the effect NO_x and PM_{10} emissions from the facility would have on visibility, deposition, and ambient air concentrations at the Mammoth Cave Class I area. The analysis incorporated the CALPUFF air dispersion model and guidance on the use of the model from the "Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts".

The CALPUFF air dispersion model was used in a "screening mode" and the "worst-case" results from the air dispersion modeling analysis were used to compare against acceptable values for the Mammoth Cave Class I area. For visibility, the Summer Shade facility was predicted to have only a 3.89% change in the visual range at the Class I area, which is below the 5% change recommended by the Federal Land Manager (FLM). The nitrogen deposition due to emissions of nitrogen compounds emitted from the Summer Shade facility was estimated to be 0.0122 kg/ha/yr as nitrogen. The FLM has not established minimum nitrogen deposition levels for Mammoth Cave; however the estimated deposition amounts are very low and should not adversely impact the Class I area. Finally, the annual NO_2 ambient air concentration (0.047 $\mu g/m^3$) and the annual and 24-hour PM_{10} ambient air concentrations (0.042 $\mu g/m^3$ and 0.280 $\mu g/m^3$ respectively) were less than the Class I PSD increment significance levels of 0.1 $\mu g/m^3$ for annual PM_{10} and NO_2 and 0.3 $\mu g/m^3$ for 24-hour PM_{10}. In summary, there is no adverse impact predicted to occur at the Mammoth Cave Class I area due to emissions from the proposed project at the Summer Shade facility.

7. ADDITIONAL IMPACTS ANALYSIS

A. Vegetation and Soil Impacts

Vegetation can be impacted from emissions of common atmospheric pollutants such as nitrogen oxides and to a much lesser extent particulate matter. The sensitivity of vegetation varies greatly with factors such as plant species, climatic and seasonal conditions, and the concentration and duration of exposure to a pollutant.

Studies of the impacts of elevated levels of nitrogen dioxide on plants has shown that short-term concentrations of more that 1,800 $\mu g/m^3$ and longer term concentrations of 200 to 500 $\mu g/m^3$ can damage vegetation. These values are much higher than the levels expected due to emissions from NO_x emissions from the Summer Shade facility. Therefore, the potential for adverse impacts to either soils or vegetation is minimal.

Similarly, studies of the effect of elevated levels of particulate matter on vegetation have shown that extremely high levels must be present in order to damage vegetation. These elevated level are usually associated with agricultural or construction activities, and are often lessened by natural weather conditions (i.e., precipitation). The low levels of PM_{10} concentrations predicted due to PM_{10} emissions from the Summer Shade facility means that nearby vegetation would not be aversely impacted.

B. Sensitive Species

The Kentucky State Nature Preserves Commission reviewed agency records to determine if there are any sensitive biological communities located near the Summer Shade facility. This review indicated that the Green River Bioreserve, which is a broad area that encompasses surface and subterranean aquatic habitats, includes the Summer Shade facility.

Due to the low levels of emissions from the Summer Shade it is not expected that any adverse impacts on the Green River Bioreserve or any other surrounding biological communities will occur. The emissions of NO_x and PM_{10} are limited by proper operation of control equipment and the process equipment itself. Furthermore, air dispersion modeling has shown that ambient air concentrations are well below the standards that have been established to protect human health and the environment and nitrogen deposition amounts are low. Thus sensitive biological communities should not be adversely impacted by emissions from the proposed project.

8. COMMENTS / RESPONSE –

<u>This Section contains Comments from USEPA Region 4</u> – letter dated September 8, 2000

Comments:

1. EPA Region 4 suggests that separate BACT limits should apply to the briquet operation.

Response:

KMC provided Kentucky DAQ with a precedent for combined emissions limits for a similar charcoal manufacturing operation. The Oregon state and the Lane County, Oregon (LRAPA) air quality regulations include a combined emissions limit for charcoal manufacturing. KMC operates a charcoal manufacturing plant in Springfield, Lane County, Oregon. This combined limit applies to emissions from the charcoal furnace and to any other sources that employ waste furnace heat.

Comments:

1. EPA Region 4 suggests that the emission factors for NOx and PM should be 11.1 and 7.23 pounds per ton of char, respectively.

Response:

Comments have been noted and will be considered in the final determinations made by the Division.

<u>This Section contains Comments from the National Park Service</u> – letter dated October 26, 2000

Comments:

1. We do not anticipate that the proposed modifications will have a significant impact on sensitive resources at Mammoth Cave National Park.

Response:

Comments have been noted and will be considered in the final determinations made by the Division.

Comments:

2. Request that KMC further evaluate the use of Selective Non-Catalytic Reduction for NOx control. Request that KMC provide a detailed cost analysis in the format presented in the EPA QAQPS Control Cost Manual.

Response:

In a letter dated February 16, 2001, KMC responded to all of the National Park Service concerns. In an email dated March 1, 2001, Bob Carson, Air Resources Specialist for the Park Service at Mammoth Cave, stated that the response provided by KMC "clearly answered the questions that we had concerning the operation of the facility". He also stated that the Park Service would have no additional comments.

9. CONCLUSION AND RECOMMENDATION

In conclusion, considering the information presented in the application, the Division has made a determination that the proposed source should meet all applicable requirements:

1. All the emissions units are expected to meet the requirements of BACT for each significant pollutant. Additionally, each applicable emission limitation under 401 KAR Chapters 50 to 65 and each applicable emission standard and standard of performance under 40 CFR 60, 61, and 63 will also be met.

2. Ambient air quality impacts on Class II areas are shown to be below the allowable PSD increments and below the NAAQS. Impacts at the Mammoth Cave Class I area are shown to be below de minimis levels.

3. Impacts on soil, vegetation, and visibility are predicted to be minimal.

PERIODIC MONITORING:

None

OPERATIONAL FLEXIBILITY:

None

CREDIBLE EVIDENCE:

This permit contains provisions, which require that specific test methods, monitoring or recordkeeping be used as a demonstration of compliance with permit limits. On February 24, 1997, the U.S. EPA promulgated revisions to the following federal regulations: 40 CFR Part 51, Sec. 51.212; 40 CFR Part 52, Sec. 52.12; 40 CFR Part 52, Sec. 52.30; 40 CFR Part 60, Sec. 60.11 and 40 CFR Part 61, Sec. 61.12, that allow the use of credible evidence to establish compliance with applicable requirements. At the issuance of this permit, Kentucky has not incorporated these provisions in its air quality regulations.

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